

NOTE ON THE 'ARNETH COUNT' IN  
HEALTHY ABORIGINAL CHILDREN OF  
NORTHERN AUSTRALIA

BY

A. BREINL

AND

H. PRIESTLEY

FROM THE AUSTRALIAN INSTITUTE OF TROPICAL MEDICINE

*(Received for publication 28 December, 1916)*

Previous work by us (1914) on Arneth counts of healthy white school children born and bred in North Queensland led to the interesting observation that the Arneth index showed a distinct increase when compared with that of normal individuals in Europe, being 74.5 as compared to 40.0.

In continuation of this investigation, opportunity was taken (1915) to estimate the Arneth index of natives—adults and children—of New Guinea.

The blood slides for this investigation were collected during a journey through the coastal districts of New Guinea, where yaws and malarial fever were endemic and more or less widely spread amongst the children examined.

The results showed that the Arneth index for adult natives corresponded closely to that of North Queensland school children of European descent, being 74.0, whereas that of the native children was considerably higher, namely 83.9.

A consideration of these figures led to the surmise that the greater shift in native New Guinea children resulted, in all probability, from the effects of active or latent malarial fever and yaws. Unfortunately none of the districts traversed were free from either of the two diseases, and it was therefore impossible to prove this surmise.

A visit to the Northern Territory of Australia afforded the desired opportunity. On Melville and Bathurst Islands, situated

off the North Coast of Australia, forty children were seen, all of whom proved healthy on examination; their spleens were not enlarged, and in none of the blood slides taken could malarial parasites be discovered, nor was there any evidence of yaws amongst them.

Arneth counts were therefore performed on these slides. The same technique was employed as in our previous work. Two sets of a hundred consecutive leucocytes were enumerated, and only counts considered where the two sets of figures agreed closely.

Table I contains the averages obtained for Arneth and differential counts of these children, and, for comparison, the corresponding figures for North Queensland school children and for natives of New Guinea, adults and children. There is a close agreement between the figures of the first three groups, whereas those for the native New Guinea children show the deviation from the European standard still more marked. This close agreement strengthens our conception that the alteration of the blood picture in North Queensland school children can be regarded as an outcome of climatic influences only.

Scott Macfie (1915) believes that 'it is probable that the abortive inoculations with malaria parasites . . . are sufficient to account for this shift in apparently healthy Europeans, without postulating the specific action of the climate on the white races living in the tropics.' He suggests, further, that 'the changes observed in the Arneth counts are due to toxæmia causing a destruction of the circulating polymorphonuclear leucocytes and a flooding of the blood with young cells liberated by the activity of the leucopoetic system.'

It is feasible that the changed Arneth picture in malarial fever can be accounted for by the reaction of the organism, and especially the blood-forming organs, to the parasitic invasion.

In the blood of the North Queensland school children and the native children of Bathurst and Melville Islands there is a distinct increase in the Arneth index. In both localities malarial fever and other parasitic infections can be excluded, and some cause, other than disease, must be sought for. The further increase in the case of the native New Guinea children, living in endemic areas, may be accounted for by infection.

We believe that the results of the Arneth counts of Northern

TABLE I

	Number	Arnett Classification per cent.					Arnett Index	Differential Counts per cent.					
		I	II	III	IV	V		Poly- morpho- nuclear neutro- phile	Transi- tionals	Large Mono- nuclear	Lympho- cytes	Eosino- philes	Mast cells
		Northern Territory Children	39	35.8	45.8	33.3		4.8	0.3	71.6	2.0	1.2	33.9
North Queensland School Children (white) ...	150	32.5	42.0	25.6	4.5	0.4	74.5	4.2	2.4	29.5	7.7	0.4	
New Guinea Adult Natives...	104	30.4	44.0	21.23	4.3	0.43	74.04	2.9	1.95	32.1	11.97	—	
New Guinea Native Children	50	42.06	40.9	13.8	2.13	0.21	83.86	2.47	1.36	42.86	13.24	—	
Normal Europeans ...	—	50	35.0	41.0	17.0	2.0	40.0*	6.8	—	20-25	2-4	0.5†	

\* Arnett

† Ehrlich-Lazarus

Australian native children, living in a healthy district, form a link in the proof that climatic conditions in the tropics as such can be held responsible for the altered blood conditions of inhabitants of the tropics, and that it is not necessary to resort to endemic disease as an explanatory factor.

#### REFERENCES

- BREINL and PRIESTLEY (1914). Changes in the Neutrophile Blood Picture of Arneth observed in children living in Tropical Queensland. *Annals of Trop. Med. & Parasitol.*, VIII, p. 565.
- (1915). Differential Counts and the Neutrophile Blood Picture of Natives—adults and children—of New Guinea. *Annals of Trop. Med. & Parasitol.*, IX, p. 495.
- MACFIE, SCOTT (1915). Nuclear Variations of the Neutrophile Leucocytes (Arneth Counts) in Malaria and Yellow Fever. *Annals of Trop. Med. & Parasitol.*, IX, p. 435.